

largest spikelets in that species, found on plants several hundred miles to the south, are on the terminal panicles also and only occasionally reach 2.1 mm in length. Johnston's specimen has long branches with the leaves crowded toward the end and appears not to have had the same habit as the tightly tufted plants with stiffly erect or ascending culms of most of the plants of *P. pacificum* found in northwest Oregon and southwest Washington. The hairs on the adaxial surfaces of the blades are short and dense, unlike the long sparse hairs found on rare hybrids between *P. pacificum* and *P. scribnerianum*, which this plant in a few respects resembles. The specimen in question is sparingly branched and has spreading to ascending hairs on the sheaths and culms, and is referable to *P. villosissimum* Nash var. *pseudopubescens* (Nash) Fernald. Many species are adventive along the lower Columbia River, near Portland, most having been introduced in ballast. Whether this species persists there has not been determined, but it was not found during a brief search of the sandy flats along the Columbia River near Troutdale in August, 1969.

*Panicum agrostoides* Spreng., also native to the eastern half of the United States, has been reported from California and British Columbia but not the intervening states. On September 8, 1966, it was found growing in moist sand well below the high water level of the Umpqua River at the Scott Creek Low Water Public Boat Access, 8 miles east of Scottsburg, Douglas Co. (*R. & M. Spellenberg 1632*, WTU, NY). Several plants were found at some distance from one another and the species is probably established along this section of the river.—RICHARD SPELLENBERG, Department of Biology, New Mexico State University, Las Cruces 88001.

## SYSTEMATIC STUDIES OF LIMNANTHACEAE

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Continuing studies of the Limnanthaceae (Ornduff and Crovello, 1968; Ornduff, 1969) have provided data relevant to an understanding of the systematic and evolutionary patterns within this small, primarily western American family of annual herbs. The primary purpose of this paper is to present the results of an extensive inter- and intraspecific crossing program within *Limnanthes*, but also included are observations on the ecology of *L. macounii*, new distributional data for some species, and first chromosome counts for *Floerkea proserpinacoides* and *L. macounii*.

### ARTIFICIAL HYBRIDIZATIONS

Because of the strong barriers to crossing among the species of *Limnanthes*, obtaining hybrids for studies of pollen viability and meiotic behavior have been difficult. Mason (1952) obtained one artificial interspecific hybrid in the genus and by making interspecific pollinations in very large numbers I have been able to obtain additional interspecific hybrids. In the following discussion, the term "pollen viability" refers to the proportion of pollen grains (based on a sample of 100) that stain with aniline blue in lactophenol. A recent study (Hauser and Morrison, 1964) suggests that this staining method sometimes results in an over-estimate of the actual viability by perhaps as much as 15%, but in general stainability of fresh pollen by this technique seems to be a

TABLE 1. POLLEN VIABILITY OF LIMNANTHES HYBRIDS. ORIGIN OF THE PARENTAL PLANTS IS LISTED BELOW

Numbers given without collector are those of the author. All localities are in California except where noted. Vouchers for these collections are in UC or JEP:

*T. Niehaus* 367, Hwy 99E, jcn. Oroville-Shippe rd., Butte Co.; *T. Niehaus* 371, Table Mt., Butte Co.; 522, D. E. Anderson s. n., Iaqua ranch, Humboldt Co.; *C. N. Smith* 550, Greenhorn Mts., Kern Co.; *R. Cruden* 943, N. of Jolon, Monterey Co.; *C. N. Smith* 1106, Greenhorn Mts., Kern Co.; 1963, *Melburn* s. n., Victoria, British Columbia, Canada; 1964, *M. Botts* s. n., Cuyamaca Lake, San Diego Co.; *R. M. Lloyd* 3358, nr. jcn. hwy. 88 and 49, Amador Co.; *R. M. Lloyd* 3359, W of jcn. of hwy. 88 and 49, Amador Co.; 4767, Sonoma, Sonoma Co.; 6148, Point Reyes, Marin Co.; 6778, Lytton Springs rd., Sonoma Co.; 6780, N of Willits, Mendocino Co.; 6781, N of Willits, Mendocino Co.; 6795, Merlin, Douglas Co., Oregon; 6828, nr. jcn. hwy. 49 and 120, Tuolumne Co.; 6832, S of Napa, Napa Co.; 6833, N of Sonoma, Sonoma Co.; 6844, Upper Lake, Lake Co.; 6845, Between Ben Hur and Raymond, Madera So.; 6847, Coarsegold, Madera Co.; 6849, Coarsegold, Madera Co.; 6851, Indian Mission valley, Fresno Co.; 6853, Sobre Vista road, Sonoma Co.; 6854, nr. Glen Ellen, Sonoma Co.; 6860, Laguna de Santa Rosa, Sonoma Co.; 6863, Manzanita, Sonoma Co.; 6864, Hessel road, Sonoma Co.; 6880, 4.4 mi. SE Calistoga, Napa Co.; 6885, N of Oroville, Butte Co.; 6915, Junction City, Trinity Co.; 6927, Pinehurst, Jackson Co., Oregon; 6980, Ukiah, Mendocino Co.

Explanation of superscripts:

a, diakinesis normal; b, metaphase I normal; c, anaphase I normal; d, metaphase II normal; e, anaphase II normal; f, telophase II and pollen formation normal; and g, meiosis abnormal—see text.

Cross, ♀ × ♂	Collection Number	Number of hybrids	Average pollen viability	Range
<b>Intraspecific</b>				
<i>douglasii nivea</i> × <i>douglasii nivea</i>	522 × 6880	1	91	—
	943 × 6844	1	95	—
<i>douglasii douglasii</i> × <i>douglasii douglasii</i>	6832 × 4767	4	99	(97-100)
	6833 × 4767	2	100	—
	6854 × 6833	1	86	—
<i>douglasii rosea</i> × <i>douglasii nivea</i>	371 × 943	3	84	(73-98)
	371 × 6844	2	94	—
	371 × 6980	1	90	—
<i>douglasii nivea</i> × <i>douglasii douglasii</i>	943 × 4767	1	97	—
<i>douglasii nivea</i> × <i>douglasii sulphurea</i>	6148 × 6844	2	96	(92, 99)
	6863 × 6148	2	99	(98, 100)
	522 × 6148	1	98	—
<i>floccosa floccosa</i> × <i>floccosa bellingeriana</i>	6927 × 6885	1	87	—
	Reciprocal	2	95	—
<i>striata</i>	6915 × 3358 <sup>b, d, e</sup>	2	76	—
	Reciprocal <sup>b</sup>	5	79	(72-89)
<i>montana</i>	550 × 1106	1	57	—
	550 × 6849	1	100	—
	550 × 6851	1	98	—
	1106 × 6845	1	100	—
	1106 × 6849	1	56	—
	6845 × 6847	1	100	—
	6845 × 6851	4	87	(82-90)
	6847 × 6845	1	99	—
	6849 × 6845	1	100	—
	6851 × 1106	3	98	(93-100)
	6851 × 6847	1	100	—

Interspecific, *Inflexae*

<i>montana</i> × <i>alba alba</i>	550 × 367 <sup>g</sup>	7	27	(2-55)
	550 × 6853 <sup>g</sup>	2	32	(17,47)
	1106 × 367 <sup>g</sup>	3	29	(24-35)
	1106 × 6853 <sup>a</sup>	5	48	(30-61)
	6847 × 6853	3	53	(34-66)
	6849 × 367	2	43	(41,45)
	6849 × 6853	2	43	(36,50)
<i>montana</i> × <i>gracilis gracilis</i>	550 × 6795	1	19	—
	1106 × 6795 <sup>b,c</sup>	7	35	(1-68)
	6795 × 6851	4	3	(0-7)
	6847 × 6795	2	16	(1,30)
	6849 × 6795	3	46	(20-60)
<i>montana</i> × <i>gracilis parishii</i>	550 × 1964 <sup>b,d</sup>	6	37	(8-47)
	1106 × 1964 <sup>b,e</sup>	5	37	(24-55)
	1964 × 6851	1	14	—
<i>gracilis parishii</i> × <i>alba alba</i>	1964 × 367 <sup>b,c</sup>	1	74	—
	1964 × 6853	3	58	(56-61)
<i>gracilis gracilis</i> × <i>alba alba</i>	6795 × 6853	1	100	—
	F <sub>2</sub>	26	85	(24-100)

Interspecific, *Reflexae*

<i>striata</i> × <i>douglasii nivea</i>	3358 × 6980	1	35	—
	3359 × 6844	1	66	—
<i>striata</i> × <i>douglasii rosea</i>	6828 × 371	5	90	(78-95)
<i>striata</i> × <i>douglasii douglasii</i>	6915 × 4767	2	100	(99,100)
<i>bakeri</i> × <i>striata</i>	6781 × 3358 <sup>b,c</sup>	2	10	(4,16)
	6781 × 6915 <sup>b</sup>	4	56	(35-70)
<i>macounii</i> × <i>striata</i>	1963 × 3358 <sup>g</sup>	3	48	(45-50)
	F <sub>2</sub>	4	77	(7-82)
	1963 × 6915 <sup>g</sup>	6	55	(41-72)
<i>douglasii nivea</i> × <i>vinculans</i>	6780 × 6861	2	94	(91,97)
<i>macounii</i> × <i>douglasii nivea</i>	1963 × 6778	1	58	—
	F <sub>2</sub>	38	65	(39-89)
	F <sub>3</sub>	46	55	(1-100)
	1963 × 6880	2	42	(40,43)
<i>macounii</i> × <i>vinculans</i>	1963 × 6864 <sup>g</sup>	3	52	(35,75)
<i>macounii</i> × <i>bakeri</i>	1963 × 6781	2	32	(19,44)
<i>bakeri</i> × <i>vinculans</i>	6781 × 6864 <sup>b</sup>	3	44	(35-55)
<i>striata</i> × <i>vinculans</i>	6915 × 6860 <sup>b</sup>	1	64	—
Intersectional				
<i>macounii</i> × <i>montana</i>	1963 × 6847	1	0	—

reliable and simple indicator of viability. The pollen viability figures for the hybrid progenies are given in Table 1. The origins of the plants used in the hybridization program are given in the appendix.

*Interspecific hybridizations:* In section *Reflexae*, hybrids between *L. striata* Jeps. and *L. douglasii* R. Br. var. *nivea* C. T. Mason showed a markedly reduced pollen viability, but those between *L. striata* and *L. douglasii* var. *rosea* (Benth.) C. T. Mason or *L. douglasii douglasii* had a high pollen viability. Since the *striata* parent of each of the above crosses originated from different populations, these variable results may be attributable to genetic differences among populations of this species rather than to a consistent trait of this species or to genetic

differences among the varieties of *L. douglasii*. This suggestion receives support from the lowered pollen viability of interpopulation crosses within this species (see below) as well as in the crosses with *L. bakeri* J. T. Howell.

Hybrids between *L. vinculans* Ornduff and the morphologically similar and near sympatric *L. douglasii nivea* (Ornduff, 1969) had a high pollen viability; hybrids between *L. vinculans* and the somewhat similar *L. bakeri* showed a sharply reduced pollen viability. Hybrids between *L. striata* and *L. vinculans* showed a moderately reduced pollen viability. One of the hybrid progenies of *L. bakeri* and *L. striata* showed a very low pollen viability; the other progeny of this hybrid combination had a higher pollen viability of 56%.

Hybrids between *L. macounii* Trel. and *L. striata*, *L. douglasii nivea*, *L. bakeri*, or *L. vinculans* all showed a low pollen viability. The  $F_2$  progeny of *L. macounii*  $\times$  *L. striata* showed an increase in average pollen viability as well as an increase in the range of pollen viabilities in the progeny. The  $F_2$  of the cross between *L. macounii* and *L. douglasii nivea* showed a similar response; however, the average pollen viability of the  $F_2$  was lower than that of the  $F_2$  and approximately equal to that of the  $F_1$ . Nevertheless, individuals were present in the  $F_3$  which had higher pollen viabilities than any individuals in either the  $F_1$  or the  $F_2$ .

In Section *Inflexae*, a number of hybrids were obtained between *L. montana* Jeps. and *L. alba* Benth. var. *alba*. The pollen viabilities of these progenies were rather low. Likewise, hybrids between *L. montana* and the morphologically similar *L. gracilis* Howell var. *gracilis* also had pollen with a low viability. Hybrids between *L. alba* and *L. gracilis* var. *parishii* (Jeps.) C. T. Mason had relative sterile pollen, but those of *L. alba alba* and *L. gracilis gracilis* had highly viable pollen. The  $F_2$  of one progeny of the latter cross showed a reduction in average pollen viability.

The sole intersectional hybrid obtained was from a cross between *L. macounii* and *L. montana*; this plant produced no viable pollen.

*Intraspecific hybridizations:* A number of intra- and intervarietal hybridizations were carried out in *L. douglasii* with particular emphasis on using parents from populations that are widely separated geographically. Although a slight reduction in pollen viability occurred in two progenies, in general these hybrids were fertile. These observations confirm those reported by Mason (1952), although he had no hybrids between *L. douglasii rosea* and *L. douglasii nivea*. Similarly, intervarietal hybrids between *L. floccosa* Howell var. *floccosa* and *L. floccosa* var. *bellingeriana* (Peck) C. T. Mason were fertile. The interpopulation hybrids in *L. striata* were between parents originating from the two disjunct areas of the range of this species on the western and eastern side of the Sacramento Valley (see below). These intraspecific hybrids showed a reduced pollen viability.

A large series of interpopulation hybridizations was carried out in *L. montana* because of the substantial population-to-population morpho-



logical variation this species shows and because some of its populations morphologically approach one or the other varieties of *L. gracilis* (Ornduff and Crovello, 1968). The number of hybrids obtained from each cross was very low, attesting to the low intraspecific, interpopulation crossability in this species that is reminiscent of similar barriers in *Blennosperma nanum* (Hook). Blake and *Lasthenia chysostoma* (F. & M.) Greene (both Compositae, see Ornduff 1963; 1966). In general, however, the pollen viability of the interpopulation hybrids in *L. montana* was high, with the exception of some of those utilizing plants from population 1106 at the southern edge of its range. However, plants from this population may also form fertile hybrids in other intraspecific combinations.

#### CYTOLOGICAL OBSERVATIONS

In 11 of the 17 hybrid progenies examined in which pollen viability ranged from 1 to 79%, meiosis associated with microsporogenesis appeared to proceed normally (see footnotes, Table 1). In the remaining 6 hybrid progenies (representing two interspecific combinations) various meiotic abnormalities were noted. The unusual meiotic behavior of hybrids between *L. montana* and *L. alba alba* consisted of the formation of three bivalents and one loosely associated quadrivalent in all cells examined ( $550 \times 367$ ) or in 25% of the cells ( $550 \times 6853$ ) with the remaining cells having 5 bivalents, or of bivalents only with a slight association between two of the bivalents ( $1106 \times 367$ ). Anaphase 1 of all hybrids was characterized by the appearance of one or two tenuous bridge-like figures between homologous chromosomes migrating toward opposite poles. These observations suggest that the chromosomes of *L. montana* and *L. alba alba* may differ by one or more very small translocations. Of the 11 metaphase 1 figures examined in one hybrid progeny between *L. macounii* and *L. striata* ( $1963 \times 3358$ ) four showed normal bivalent formation and 7 showed three bivalents and one chain or ring quadrivalent. In another hybrid progeny of these two species five bivalents were present, but three of these bivalents were loosely associated with each other at metaphase 1 although it is not clear whether the latter constituted a true multivalent. In hybrids between *L. macounii* and *L. vinculans* three bivalents were present along with variable asymmetrical multivalent configurations of four chromosomes whose exact cytological nature was not determined. These superficial chromosomal studies of hybrids between *L. macounii* and *L. vinculans* suggest that these two species may also differ by at least one very small translocation or, alternatively, that the chromosomal set of one species contains some duplicate chromosomal segments of the other species.

The absence of meiotic chromosomal irregularities in the majority of interspecific hybrids of *Limnanthes* indicates that a number of species in the genus have similar gross chromosomal structure. The nature of the cytological irregularities observed in a few of the interspecific hybrid progenies suggests that those interspecific chromosomal differences which

do exist are of a relative minor nature. It is probable, therefore, that the sterility observed in these hybrids primarily has a genetic basis rather than a cytological one since sterility may also occur in the absence of meiotic irregularities. Progeny-to-progeny variation in average pollen stainability of intraspecific, interpopulation hybrids (notably within *L. montana*) as well as in interspecific hybrids (e.g. *L. montana*  $\times$  *L. gracilis*) suggests that the substantial morphological variation within some *Limnanthes* species may be associated with genetic differences which affect the pollen viabilities of their hybrid progenies, although the well-marked geographical differences characteristic of the varieties of *L. douglasii* are not associated with such "sterility" genes.

In section *Inflexae*, it is interesting to note that *L. montana* and *L. gracilis* are morphologically so similar that some populations of the two species are barely separable (Ornduff and Crovello, 1968) yet these two species are consistently separated by a sterility barrier which reinforces their mutual geographical isolation. In contrast, the relatively dissimilar *L. gracilis* and *L. alba alba* may form relatively fertile hybrids. In section *Reflexae*, there is likewise no consistent relationship between morphological similarity of the parents and fertility of their hybrids. For example, the relatively similar *L. bakeri* and *L. vinculans* produce rather infertile hybrid progeny, whereas the rather more dissimilar *L. striata* and *L. douglasii rosea* form relatively fertile hybrids.

The lack of relationship between geographical distribution, ease of crossability, and hybrid fertility deserves further comment. The range of the morphologically distinctive *L. macounii* is geographically well removed from that of other members of the genus. The large number of interspecific hybrid combinations in which this species was a parent (including the only intersectional hybrid obtained) attests to its comparatively high crossability with other members of the genus. Despite this, however, all hybrid progenies of *L. macounii* showed a substantially reduced pollen viability. In contrast, hybrids between sympatric or marginally sympatric species of *Limnanthes* are difficult to obtain. In the field, I have observed the following sympatric combinations of species: *L. bakeri* with *L. douglasii nivea*; *L. alba versicolor* and *L. alba alba* with *L. floccosa floccosa*; and *L. vinculans* with *L. douglasii nivea*. Despite repeated attempts, no artificial hybrids have been obtained in the first three combinations. Two hybrid individuals were obtained between *L. douglasii nivea* and *L. vinculans*, but only when individuals from allopatric populations were used. When individuals were used that had originated from localities where interspecific population contact occurs all hybridization attempts failed.

#### Chromosome Counts

Despite its abundance in much of North America, there are no reported chromosome counts for *Floerkea proserpinacoides* Willd. Cytological examination of greenhouse-grown plants from seed collected near

Bloomington, Monroe Co., Indiana (*Heiser 6305*, UC) and from Trelease Woods, Champaign Co., Illinois (*D. M. Smith* in 1964, UC) indicate that this species has  $n = 5$ . Mason (1952) reported  $n = 5$  for all species of *Limnanthes* that he recognized with the exception of *L. macounii*, which he believed to be extinct. My investigations of this species based on plants grown from seed collected in Uplands Park, Victoria, British Columbia, by Miss M. Melburn, indicate that this species has  $n = 5$ .

#### ECOLOGY OF *L. MACOUNII*

Mason (1952) and Hitchcock (1961) believed that *L. macounii* possibly was extinct since it had not been collected since 1926 and the few localities known for it on Vancouver Island had been subjected to ecological disturbance by man. However, in 1958 Miss M. C. Melburn of Victoria located a population of this species in Uplands Park, Victoria, just above the Straits of Georgia. A second recent collection of *L. macounii* was made from a single population on Trial Island (*Calder & Mackay 28917*, DAO). This island is less than a half mile from the coastline of Victoria. However, in a recent visit to this locality, Miss Melburn was unable to find any plants on this island. The total known range of this species (including five other sites where it is now extinct) is included in a radius of three miles. In view of the unusual disjunct distribution of this species relatives to the rest of the genus in southern Oregon and California and in view of its present rarity, the following information is presented concerning the habitat and associates of *L. macounii* based on Miss Melburn's notes: *Limnanthes macounii* occurs in one or two populations where the prostrate plants are densely crowded and associated with other herbaceous annuals such as *Alchemilla occidentalis* Nutt., *Microseris bigelovii* (Gray) Sch.-Bip., *Montia dichotoma* (Nutt.) Howell, *Montia howellii* Wats., *Myosurus minimus* L., *Orthocarpus faucibarbatulus* Gray subsp. *albidus* Keck, *O. pusillus* Benth., *Plagiobothrys scouleri* Johnst., *Plantago bigelovii* Gray, and various annual grasses. The site is a vernal pool which has a very thin mantle of soil on a rock bed. Based on observations extending over 8 years, first flowering dates of *L. macounii* extend from March 27 to April 22. Insects have not been observed visiting the flowers. In cultivation, the species is wholly autogamous.

#### NEW DISTRIBUTIONAL DATA

Mason (1952) cites a collection of *L. alba alba* from Sonoma Co., (Glen Ellen, *M. S. Baker* in 1923, JEP) but does not include this collection in his description of the range of the species nor is it indicated on his map of its range. Other collections of *L. alba alba* from Sonoma Co. are: Near Santa Rosa, *Mrs. (A. E.?) Alexander* in April, 1944 (CAS); Warfield, *M. S. Baker 4996* (CAS); Agua Caliente, *L. Rose 51007* (CAS); Jack London Ranch, *P. Raven 347* (CAS); Sobre Vista road, *R. Ornduff 6846* (UC). This variety is also known from a single

locality in Lake Co.: Junction of highways 175 and 29, *Cruden 1001* (UC). *Limnanthes floccosa*, likewise considered to be a species unrepresented in California west of the Sacramento Valley, occurs in a single population very near the Lake County population of *L. alba alba*. This population is referable to *L. floccosa floccosa*; it occurs in an extensive area of a vernal lake bed north of the junction of highways 29 and 175 (*Ornduff 6811*, UC). Another collection which is probably from the same population is: 5 or 6 miles south of Kelseyville, *M. S. Baker 5989*, Santa Rosa Junior College Herbarium. *Limnanthes douglasii sulphurea*, known previously only from Point Reyes, Marin Co., recently has been collected in coastal San Mateo Co., Canyon Road, *W. Anderson* in 1966 (CAS); Butano Creek Canyon, *J. and B. McClellan* (CAS).

The taxon designated as *L. "trinity"* in an earlier paper (Ornduff and Crovello, 1968) is now referred *L. striata*. The populations given this provisional name are disjunct from the chief range of *L. striata*, which extends along the eastern side of the Central Valley from Eldorado Co. south to Mariposa Co. Plants initially called *L. "trinity"* were collected from a population well to the northwest of this area, west of the Sacramento valley in the northern Coast Range of Trinity Co. Plants in this population were small and had very small flowers. These characteristics were retained in garden progeny. Subsequent field studies in this region turned up additional populations consisting of larger plants with larger flowers that are indistinguishable from those of *L. striata* in the southeastern main portion of its range.

These collections of *L. striata* from this disjunct northwestern area of distribution are: Trinity Co., 3.2 miles northwest of Junction City, *Ornduff 6915* (UC), *Heckard & Ornduff 1488* (JEP), *Cruden* in 1965 (UC); Shasta Co., west edge of Platina, *Ornduff 6918* (UC), *Heckard & Ornduff 1505* (JEP); Tehama Co., near Beegum, *Ornduff 6919* (UC), *Heckard & Ornduff 1507* (JEP); six miles SE of Platina, *Heckard & Ornduff 1508* (JEP). Despite the unusually small size of the Junction City collections, I am inclined to refer all of these northwestern plants to *L. striata*.

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#### SUMMARY

An extensive crossing program among species of *Limnanthes* confirms earlier observations that interspecific crossability in this genus is low. However, once artificial interspecific hybrids are obtained they show various levels of pollen sterility which seem unrelated to the degree of morphological difference between the parents. Observations of meiosis in



interspecific hybrids suggest a large degree of chromosomal homology among the species, although small translocations or duplications may exist. Intraspecific, interpopulation hybrids in *Limnanthes* are generally fertile, with a few exceptions in *L. montana* and *L. striata*. Chromosome counts of  $n = 5$  are reported for *Floerkea proserpinacoides* and *L. macounii*, thus completing a cytological survey of the family. Habitat data are recorded for *L. macounii*, now known from only a single population on Vancouver Island. Range extensions of *L. alba alba*, *L. floccosa floccosa*, and *L. striata* are given in the North Coast Ranges, and *L. douglasii sulphurea* is reported from San Mateo Co. Further field work on *Limnanthes* "trinity," considered to be an underscribed species in an earlier paper, indicates that these disjunct populations of this entity are best referred to *L. striata*.

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#### REVIEWS

*Flora of the Galápagos Islands*. By IRA L. WIGGINS and DUNCAN M. PORTER. xx + 998 pp., 96 color photos, 268 line figures, 170 range maps. Stanford University Press. 27 May 1971. \$37.50.

The Galápagos continue to be fascinating as much in fact as in fancy since they became famous to biologists following the visit of Charles Darwin. He had been preceded by only a few other plant collecting enthusiasts, among them David Douglas and John Scouler. The book by Wiggins and Porter, which includes the contributions from 28 other botanists, goes a long way towards confirming that in addition to the fabled animals, these islands do indeed have plants, many of them also interesting. According to G. L. Stebbins (1966, p. 46. In: *The Galápagos*, Ed. R. I. Bowman, Univ. Calif. Press), some aspects of the specimens of higher plants of this archipelago collected by Darwin helped to lead the latter "along the road toward the Origin of Species . . ."

The taxonomic portion includes 107 families, 348 genera, and 642 species. Better than a third (228 species and subspecies) are endemic. "Some" 395 taxa are illustrated, "at least one species in every genus considered." There are identification keys to all taxa, generous descriptions usually with valuable supporting commentaries,